

Explanation of plates

Guide to symbols used in electron micrographs and some of light micrographs.

CW, cell wall; CMS, concentric membranous structure; DED, deposition of electron-dense materials; ER, endoplasmic reticulum; FL, fibrous layer; ICS, intercellular space; INV, invagination; LO, lomasome; M, mitochondrion; N, nucleus; NM, nuclear membrane; NU, nucleolus; P, pore; PM, plasma membrane; S, septum; RIB, ribosome; V, vacuole; W, woronin body.

Plate 1. Light micrographs of vertical sections of sclerotia.

- 1: A sclerotium at earlier stage of development.
- 2: A 'white' sclerotium.
- 3: A 'slightly pigmented' sclerotium.
- 4: A 'mature' sclerotium.
- 5: A sclerotium germinated to form mycelium. Rind is partially destroyed (arrows).

Plate 2. Ultrathin sections of vegetative hyphae.

- 1: A part of hyphal cell.
- 2: A septum (S) associated with Woronin bodies(WB).
- 3: Lomasome (LO) between the cell wall (CW) and plasma membrane (PM).
- 4: Nucleus (N) with double nuclear membrane (NM) and mitochondrion (M).

Plate 3.

- 1: Ultrathin section of vegetative hyphae showing a septum (S) with simple pore and electron dense deposition (DED) on the pore rim.
- 2: A typical ultrathin section of a 'white' sclerotium. Note the outgrowth of fibrous layer (arrows).

Plate 4. Ultrathin sections of medullary cells of 'white' sclerotium.

- 1: Invaginations (INV) of plasma membrane.
- 2: A transverse section of cell.
- 3: The ingrowth (arrows) of lateral wall to form a new septum.
- 4: Lomasomes (LO) located near the septum (S).

Plate 5. Ultrathin sections of medullary cells of 'slightly pigmented' sclerotium.

- 1: A large vacuole (V) including a concentric membranous structure (CMS) and electron-dense amorphous materials (AM).
- 2: Cell in process of thickening of wall. Note the significant invaginations of the plasma membrane and the deposition of electron dense, amorphous materials within vacuoles (V).
- 3: Cell including elongated mitochondria (M) and amorphous material containing vacuoles (V).

Plate 6.

- 1: Ultrathin section of cell of 'slightly pigmented' sclerotium showing a well-developed fibrous layer (FL) enveloped with a electron-dense thin layer (EDL).
- 2: Ultrathin section of medullary cell of 'mature' sclerotium showing degenerated mitochondria (M), vacuoles (V) filled with electron dense amorphous materials and a micro-body like inclusion having a crystalline structure (CR).
- 3: Enlarged inset of a micro-body like inclusion in 2.

Plate 7. Ultrathin sections of 'mature' sclerotium.

- 1: Portion of medullary cell wall showing the relative thickness of different layers.
- 2: A part of medulla showing intercellular space (ICS).
- 3: Rind layer.
- 4: Portion of rind cell wall showing large middle zone containing microfibrill and inner- and outermost electron-dense layer.

Plate 8. Ultrathin sections of medullary cells of 'mature' sclerotium varying fixation.

- 1: Cell having a septum. Glutaraldehyde+acrolein and OsSO₄.
- 2: Cell having a septum. KMnO₄.

Plate 9.

- 1: Untreated section of 'mature' sclerotium stained with PAS reagent. Arrows indicate PAS negative granules.
- 2: Section of the same tissue subjected to the α -amylase digestion.
- 3: HPMA section of 'white' sclerotium stained with toluidine blue, pH 4.4.
- 4: Same section of 'slightly pigmented' sclerotium.
- 5: Same section of 'mature' sclerotium. Note the metachromatic granules (arrows).
- 6: Chitosan reaction in cell wall and septa (arrows) of medullary cell of 'mature' sclerotium.
- 7: A fluorescence micrograph of medullary cells stained with diluted aniline blue, pH 9.0.
- 8: Same micrograph as 7 except for ordinary illumination.
- 9: A fluorescence micrograph of isolated β -1, 3 glucans stained with diluted aniline blue.

Plate 10. Enzyme treated sections of 'mature' sclerotium; 1~3, stained with PAS; 4~6, unstained, phase contrast.

- 1: Untreated section.
- 2: Section treated with β -1, 3 glucanase.
- 3: Section treated with β -1, 3 glucanase + papain.
- 4: Untreated section.
- 5: Section treated with β -1, 3 glucanase.
- 6: Section treated with β -1, 3 glucanase + papain.

Plate 11. Vertical sections of sclerotium showing successive stages of apothecial stipe development.

- 1: Stage I-primordium showing deeply stained meristematic structure.
- 2: Stage I-primordium increased in size, but pigmentation not yet occurs.
- 3: Stage II-primordium. Dark pigments occur around the primordium.
- 4: Stage II-primordium infiltrated with pigmentation.
- 5: Stage III-primordium.
- 6: Stage IV-primordium.

Plate 12.

- 1: Apothecial stipe development from the cut surface of sclerotium.
- 2: Section of a cubed medullary tissue with regenerated rind producing apothecial stipe primordia (arrows).
- 3: Section of a cubed medullary tissue showing regenerated rind and its germination.
- 4: Development of mature apothecia from cubed medullary tissues.

Plate 13. Vertical sections of germinating sclerotium of related species.

- 1: *Sclerotinia allii*.
- 2: Ditto.
- 3: *S. borealis*.
- 4: Ditto.
- 5: *Monilinia mali*.
- 6: Ditto.
- 7: *S. trifoliorum*.
- 8: Ditto.

Plate 14. Ultrathin section of germinating sclerotium showing the cellular condition of non-primordial

region in medulla. Vacuoles (V) filled with electron-dense, amorphous materials are predominating in cytoplasm, but well-developed endoplasmic reticulum (ER) and zonation of cell wall (CW) are seen.

Plate 15.

- 1: Ultrathin section of medullary cell of germinating sclerotium showing development of endoplasmic reticulum (ER). KMnO_4 .
- 2: Ultrathin section of the same cell showing lysed fibrous layer (FL) and zonation of cell wall (CW). KMnO_4 .
- 3: Ultrathin section of medullary cells of germinating sclerotium of *Sclerotinia allii*. KMnO_4 .
- 4: Ultrathin section of medullary cells of germinating sclerotium of *S. lorealis*. KMnO_4 .

Plate 16.

- 1: Degenerated cell in medulla of germinating sclerotia.
- 2: Almost completely degenerated cell adjacent to healthy one. A pore is plugged with a Woronin body (WB).
- 3: A primordial cell cluster in medulla. Note the difference of size between primordial cells (PC) and medullary cells (MC).

Plate 17. Ultrathin section of medullary tissue showing a contrasted appearance of primordial cells (PC) and medullary cells (MC). Note the decrease of contents in vacuoles (V) in medullary cells adjoining to primordia and deposition of electron-dense materials among primordial cells.

Plate 18.

- 1: Ultrathin section of a primordium. Note deposition of electron dense materials (DED), and thin wall, irregular shape and size of primordial cells.
- 2: Peripheral part of primordium showing deposition of electron dense materials in fibrous layer of adjoining medullary cell.

Plate 19.

- 1: A part of primordium.
- 2: Cytoplasmic appearance of a primordial cell showing many ribosomes and mitochondria.

Plate 20.

- 1: Endo-hyphae like cells in medulla. KMnO_4 .
- 2: Ultrathin section of a medullary cell of which different layers in a cell wall are separated each other. Note many ribosomes and endoplasmic reticulum.
- 3: Ultrathin section of medullary cell at the same state of 2. Note highly electron-dense zone between the separating layers.
- 4: Endo-hyphae like cell in the medulla of germinating sclerotium of *Sclerotinia lorealis*.

Plate 21. Ultrathin sections of cells composing stipe tissue.

- 1: A cell located in basal region of stipe. Note the zonation (arrow) of cell wall (CW), many mitochondria (M) and ribosomes in cytoplasm.
- 2: Transverse section of stipe cell.

Plate 22. Ultrathin section of a contacting point of sclerotial medulla with a stipe fundament. Note coexistence of medullary cells enveloped with fibrous layer and irregular, distorted cells of stipe fundament. Arrow indicates the direction of stipe growth.

Plate 23.

- 1: Distorted cells of stipe fundament in medullary cells. Zonation occurs in medullary cell wall (arrow). KMnO_4 .
- 2: A part of medullary tissue of a decayed sclerotium from which many apothecia have been produced.

Cell walls disappear and fibrous layers mostly lose their structure. KMnO_4

3: Fibrous layers holding their structure in a decayed sclerotium. KMnO_4

4: A transverse section of secondarily formed hyphal cell in decayed medullary tissue. KMnO_4

Plate 24. Light micrographs of histochemical reaction in sections of sclerotium.

1: PAS reaction in a primordium and the surrounding medullary tissue.

2: Proteins stained with mercuric bromphenol blue in a primordium and surrounding medullary tissue.

3: The same staining as 2.

4: The same as 2. A primordium at later phase of stage III.

Plate 25. Light micrographs of histochemical reaction in sections of sclerotium.

1: Millon reaction in non-primordial region of medullary tissue.

2: Millon reaction in a primordium and the surrounding medullary tissue.

3: Millon reaction in a stage IV-primordium.

4: Non-primordial region of medullary tissue stained with pyronin.

5: Pyronin staining of a primordium and surrounding medullary tissue. An intense staining in primordium (arrow).

6: Stage IV-primordium stained with toluidine blue.

7: HPMA section stained with toluidine blue. A primordium (P) is stained blue and lacking polyphosphate like granules. An adjoining medullary cell lacking such granules is seen (arrow).

Plate 26.

1: Section of young apothecial stipe stained with pyronin. Intense staining is seen in apical region and some cells distributing in middle zone (arrow).

2: Same section treated with ribonuclease and stained as 1.

3: Section of sclerotia including a stage II-primordium stained with toluidine blue.

4: Same section treated with ribonuclease and stained as 3.

5: Section stained with Masson's ammoniacal silver nitrate. Intense staining is seen in primordia (arrows) as well as rind.

Plate 27.

1: Section of medullary tissue of germinating sclerotia showing basophilic, intercellular matrix in pyronin staining (arrows).

2: Basophilic, intercellular matrix in toluidine blue staining (arrows).

3: Distribution of succinate dehydrogenases activities in longitudinal section of young stipe. Note high activities in the cells of inner part (right).

4: The same reaction as 3 in the non-primordial region of medulla of a germinating sclerotium.

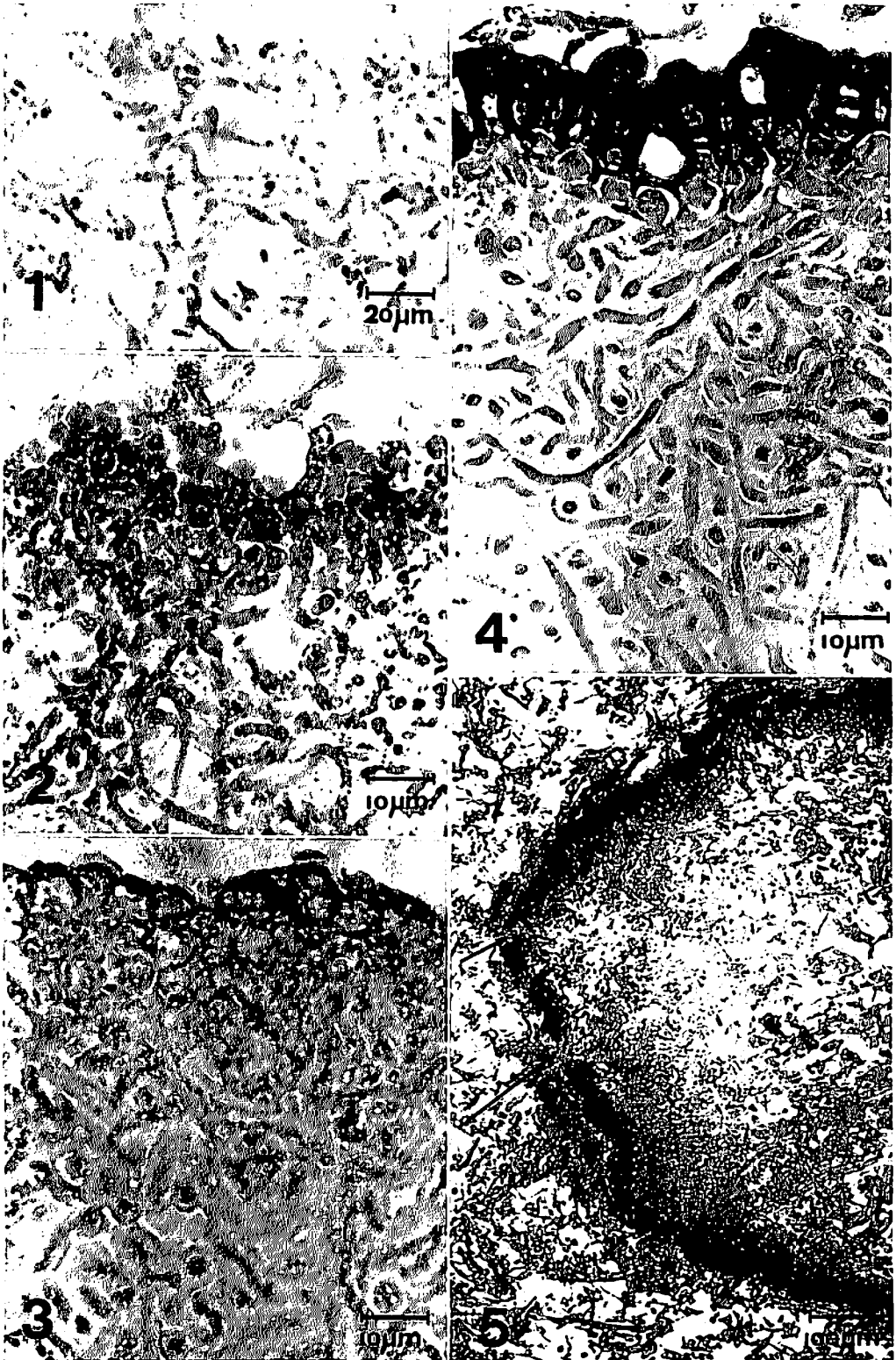


Plate 1.

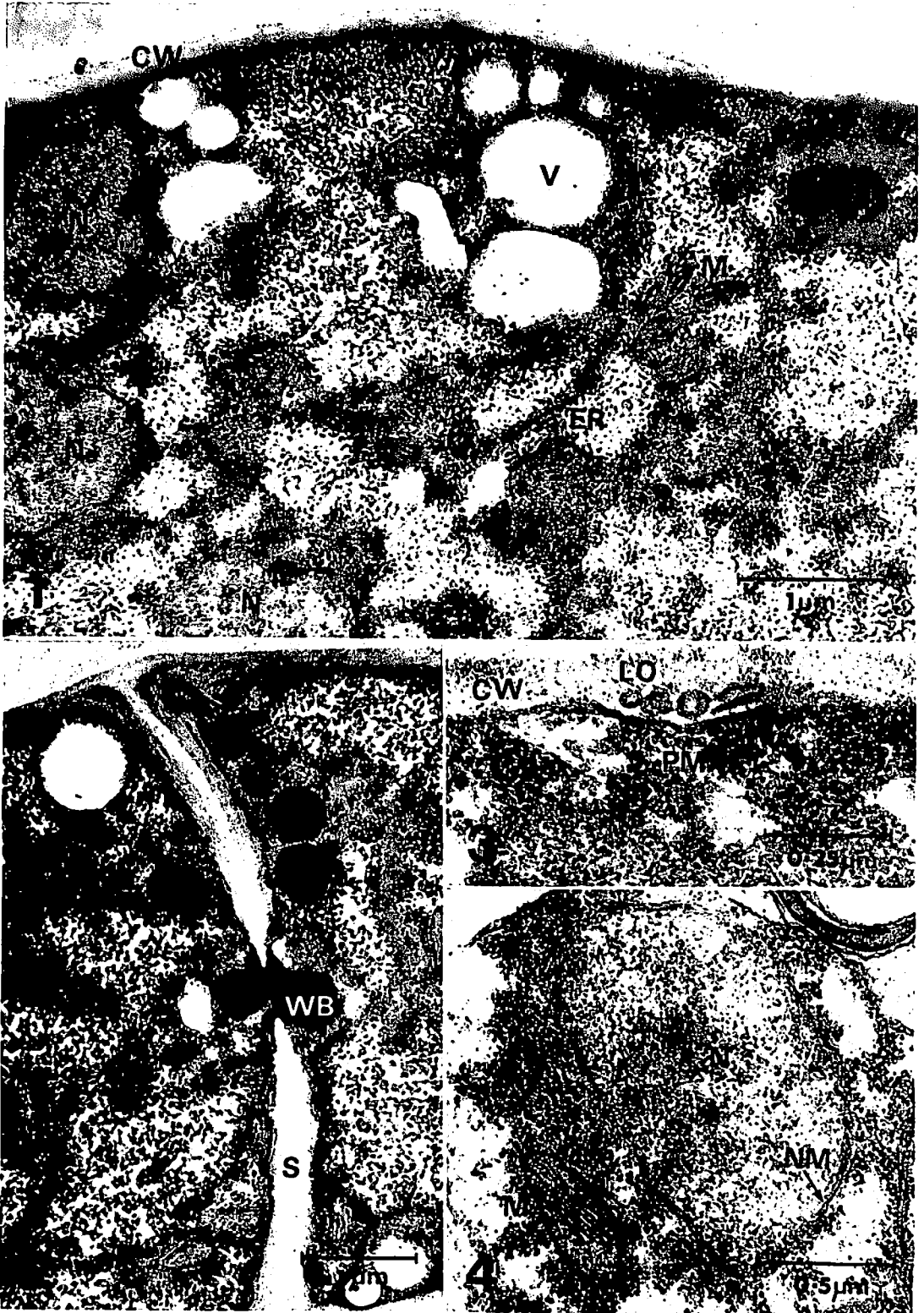


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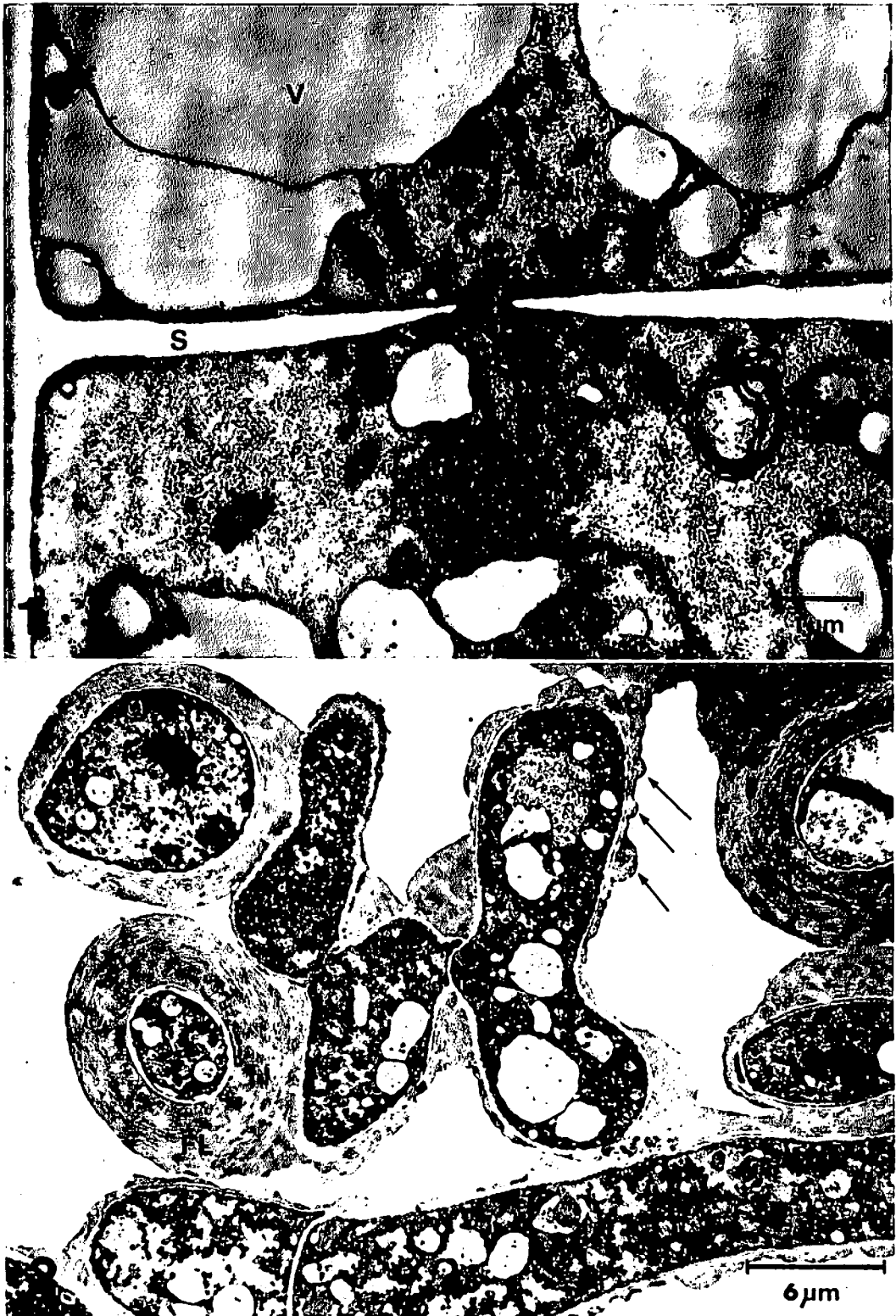


Plate 3.



Plate 4.

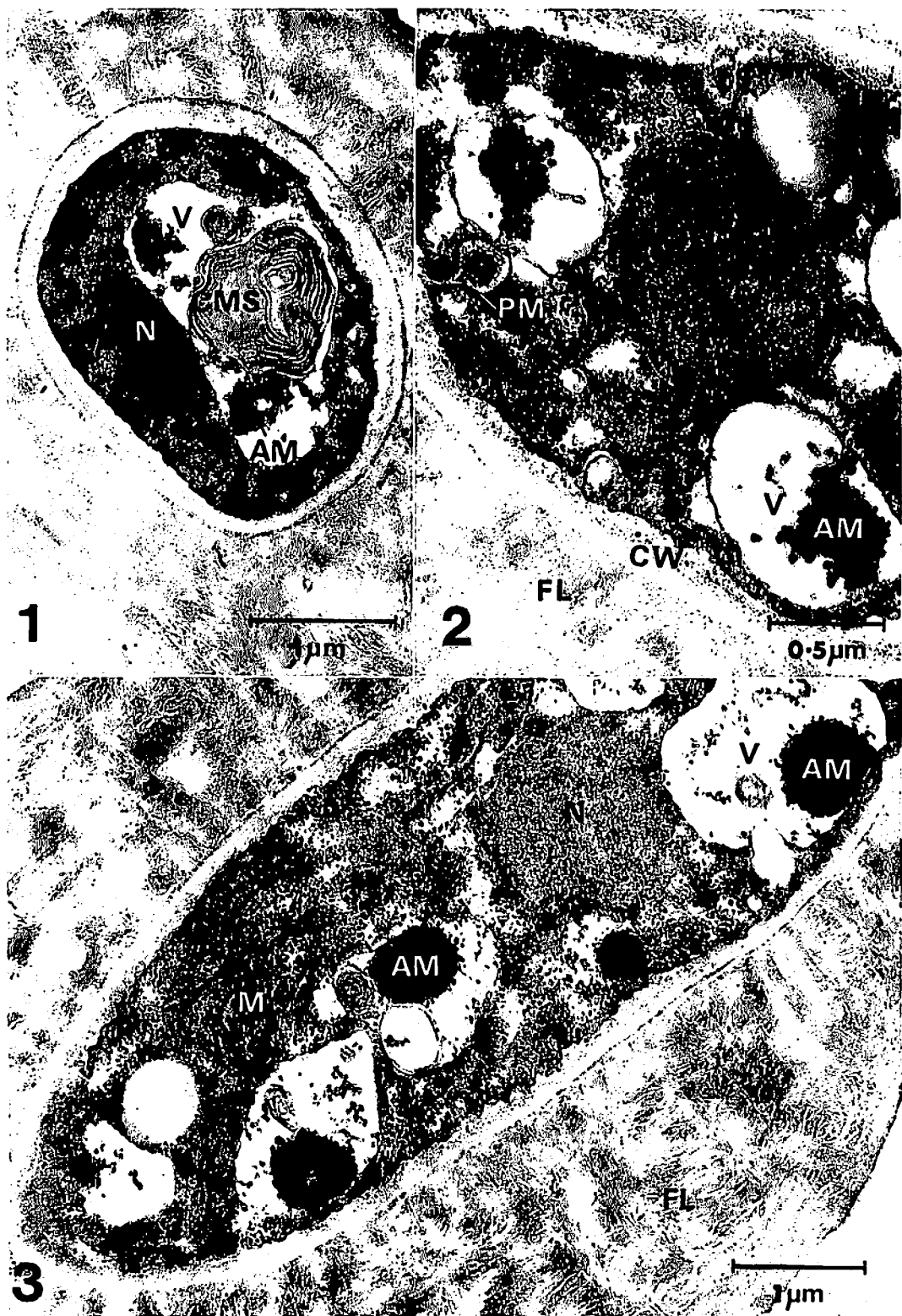


Plate 5.



Plate 6.

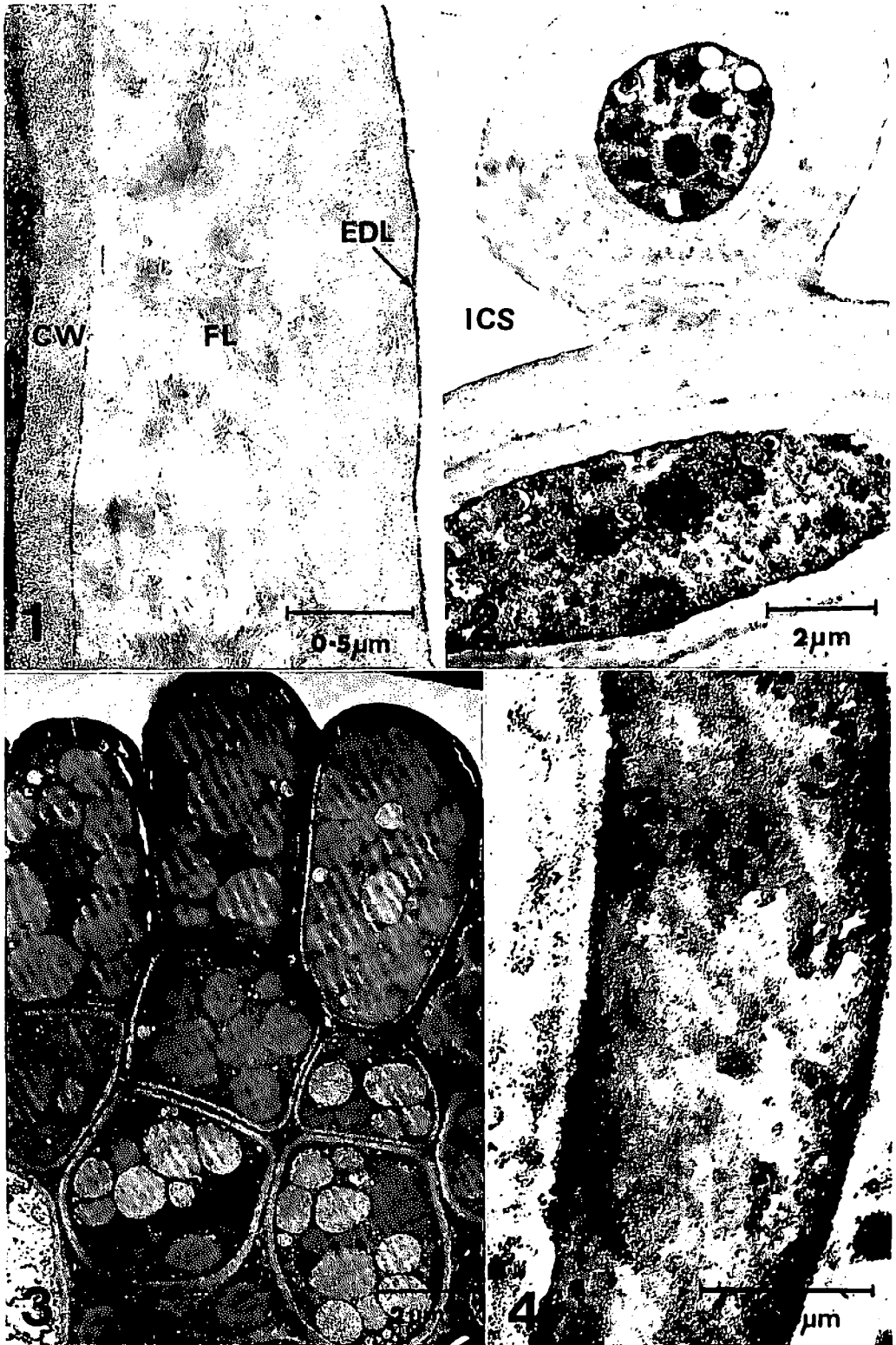


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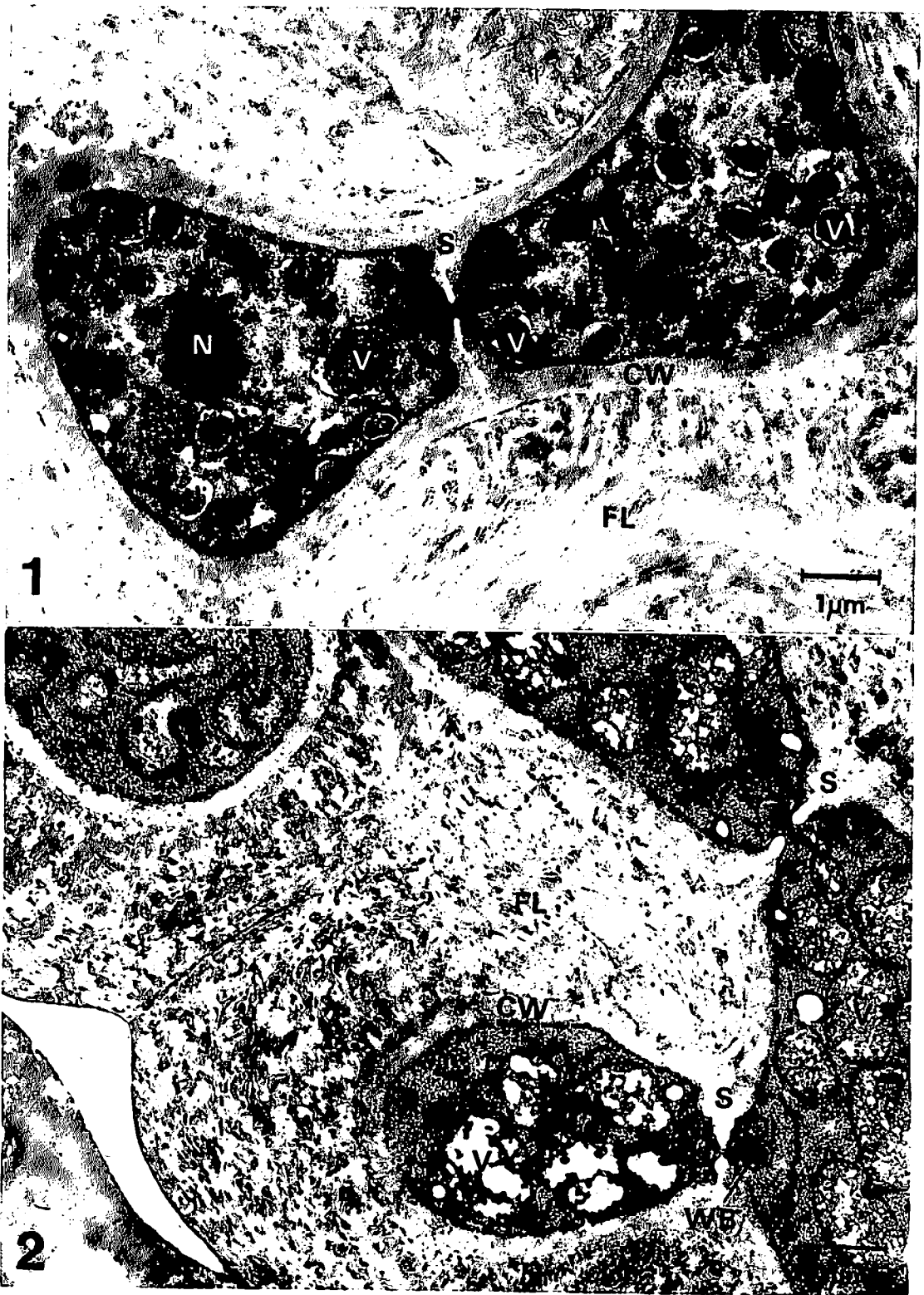


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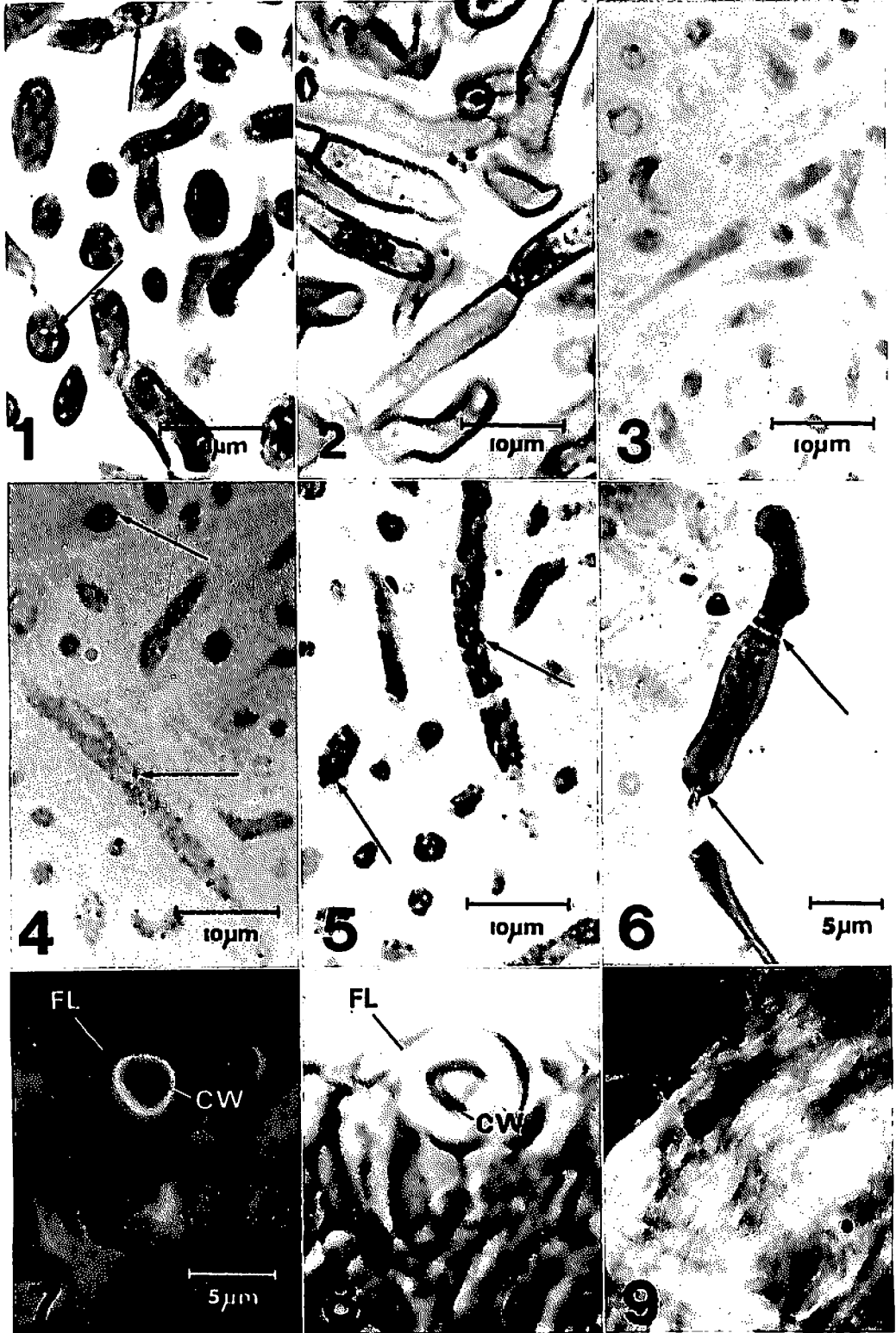


Plate 9.



Plate 10.

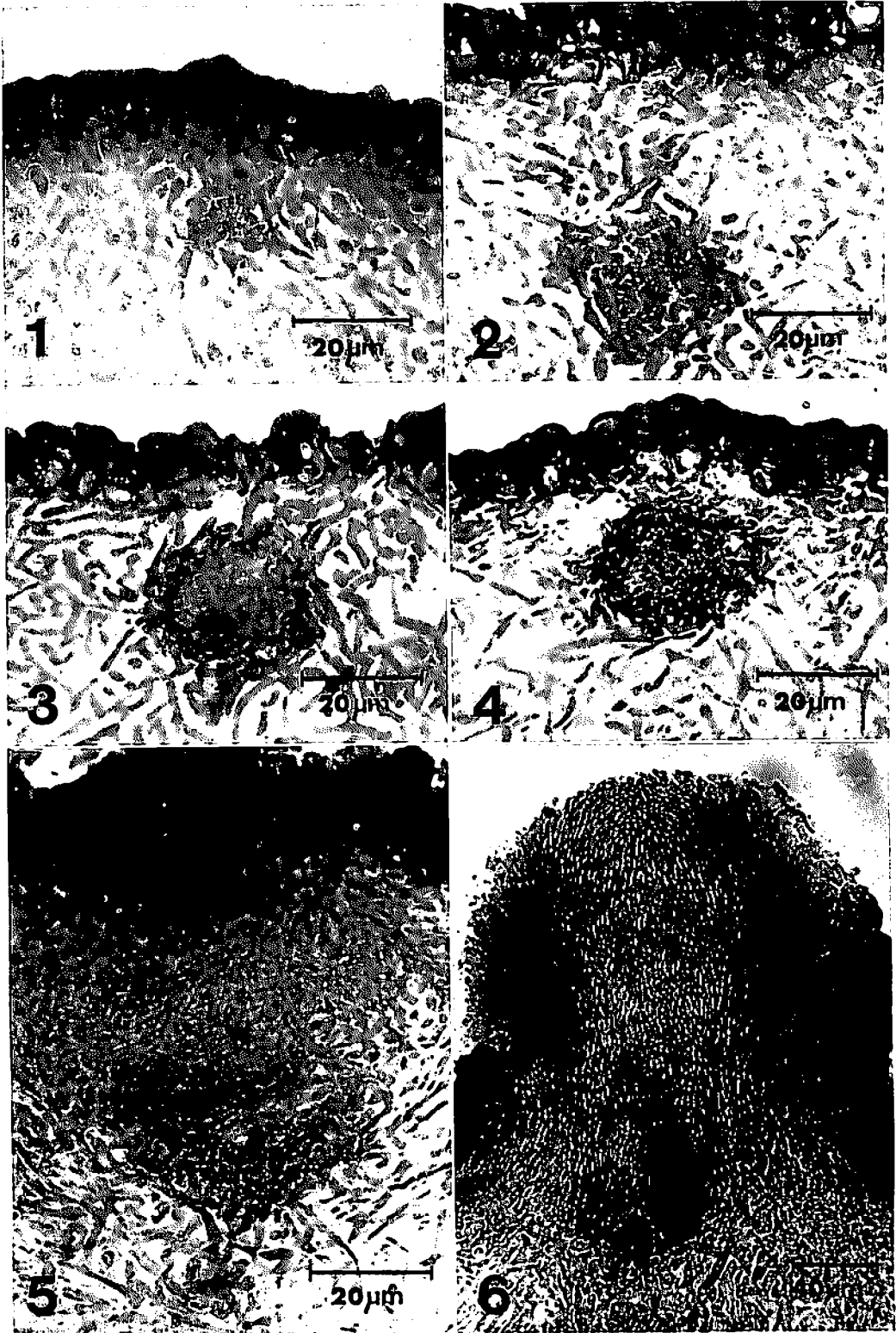


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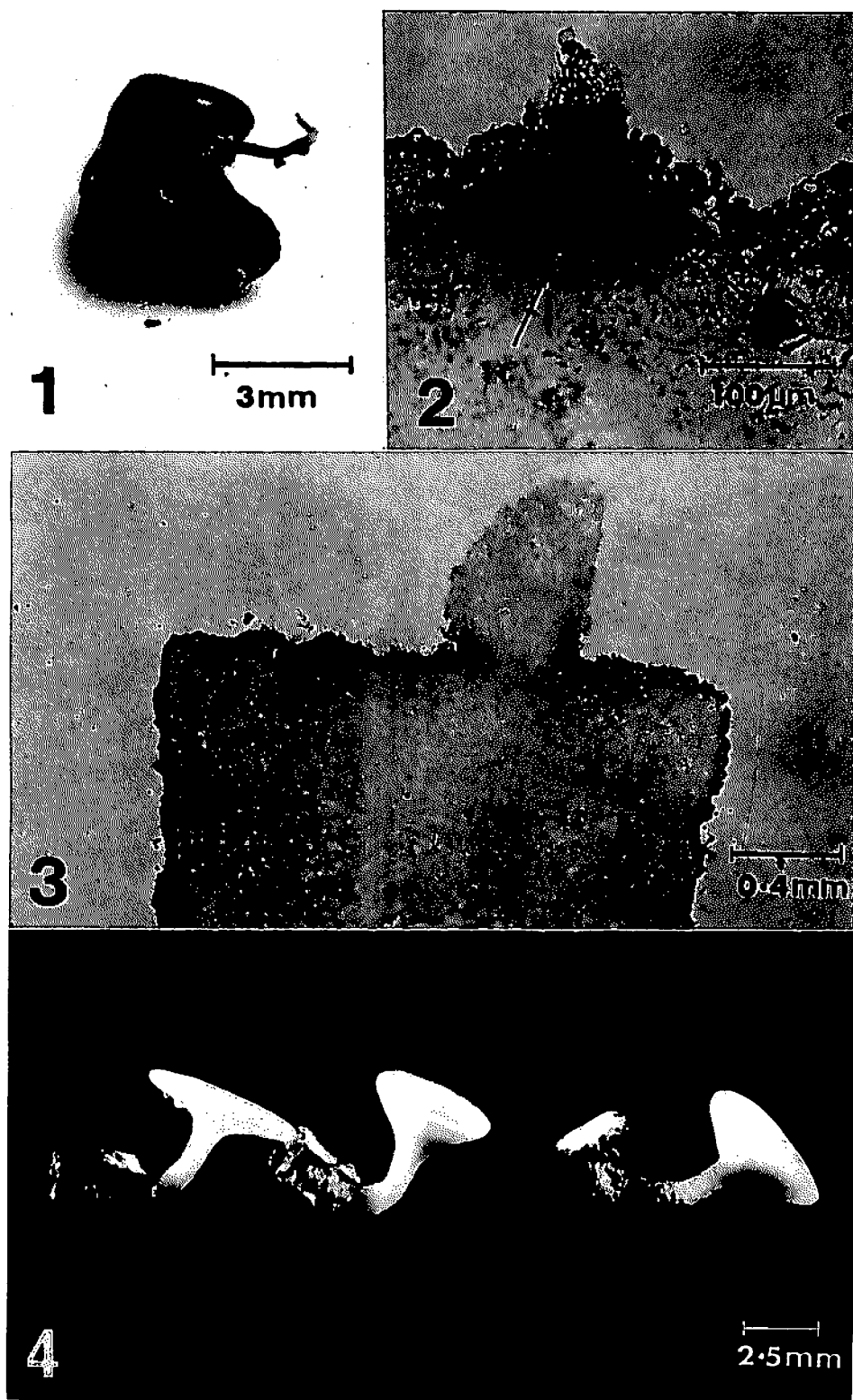


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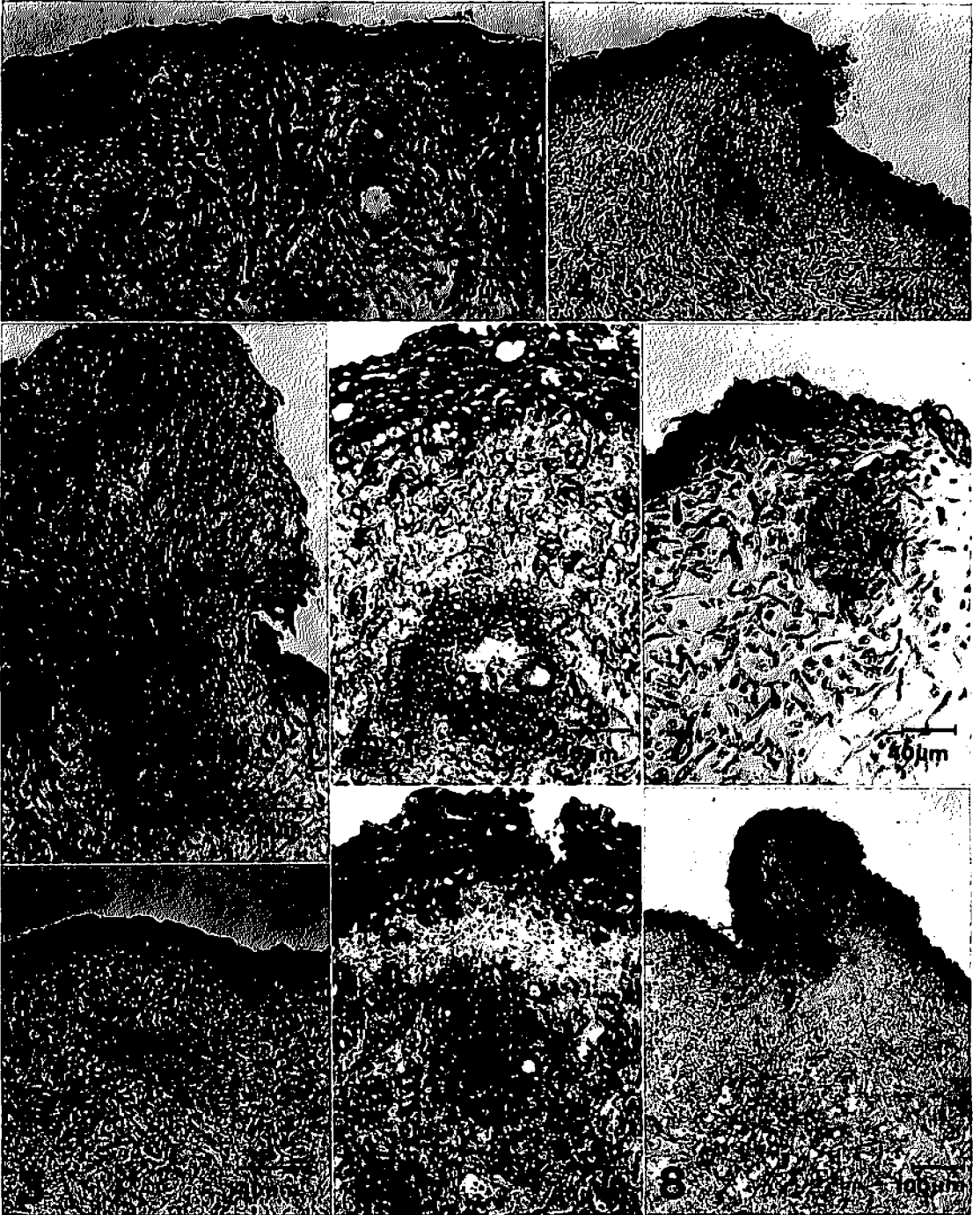


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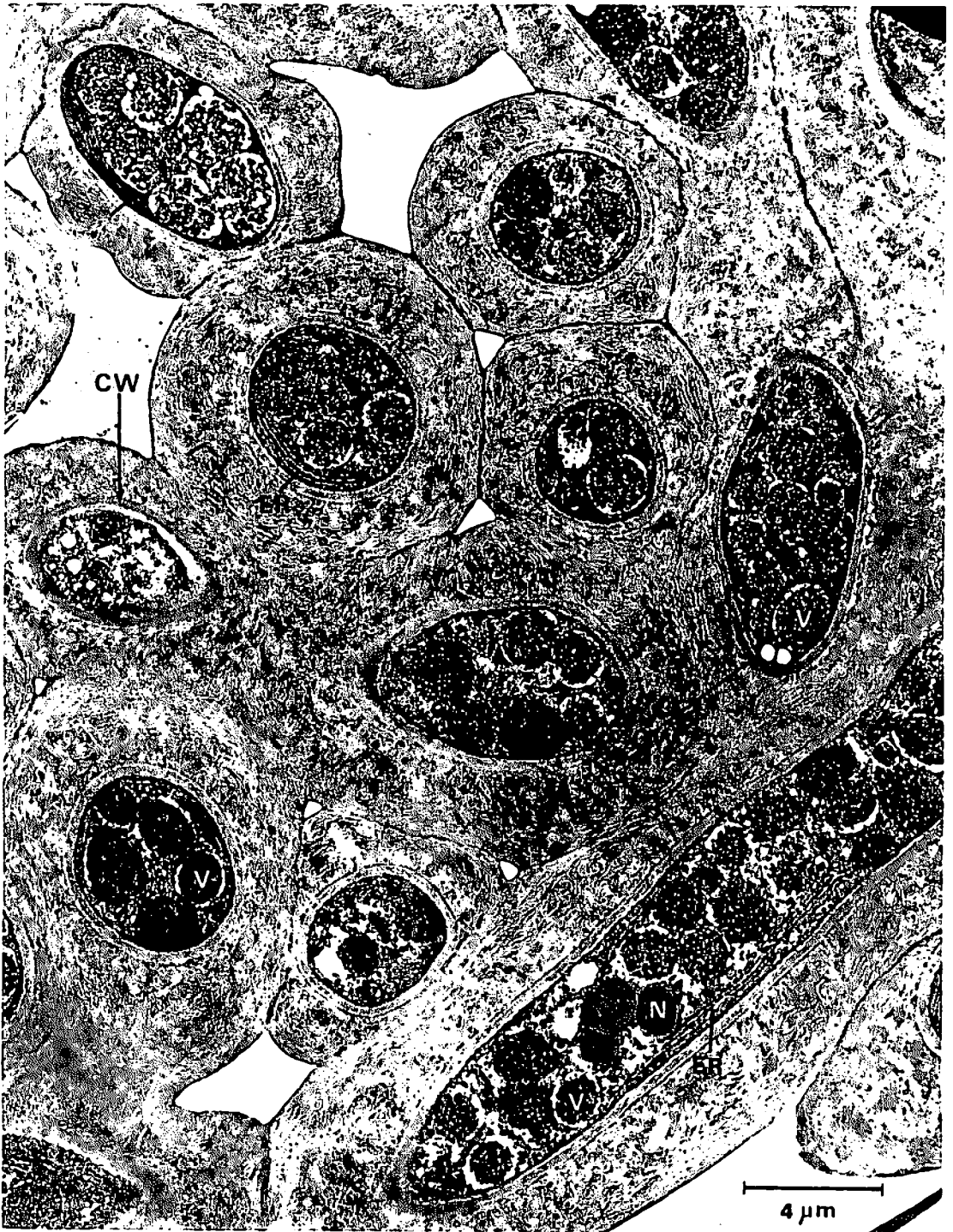


Plate 14.



Plate 15.



Plate 16.